Claims

1. Droplet deposition apparatus for depositing droplets on a substrate and comprising an elongate printhead, the substrate being movable relative to the printhead in a substrate movement direction and the length of the printhead extending in a printhead direction orthogonal to the substrate movement direction, wherein the printhead comprises at least one print head unit, the or each print head unit comprising at least two parallel rows of nozzles extending in the printhead direction with the rows being spaced apart in the substrate movement direction; actuation means for effecting the selective ejection of droplets from respective nozzles and a droplet fluid supply arrangement disposed such that a different fluid may be supplied to each row of nozzles.

2. Apparatus according to Claim 1, wherein each printhead unit comprises at least three and preferably four rows of nozzles, with each row of nozzles receiving from the supply arrangement a different colour of ink.

3. Apparatus according to any preceding claim, wherein each nozzle in one row of nozzles is aligned in position in the printhead direction with a nozzle in each of the other rows of nozzles.

4. Apparatus according to any preceding claim, wherein each row of nozzles has the same length.

5. Apparatus according to any preceding claim, wherein each row of nozzles has the same inter-nozzle spacing.

6. Apparatus according to any preceding claim, wherein the actuation means for effecting the selective ejection of droplets from respective nozzles, comprises for each nozzle a pressure chamber in communication with the nozzle and in communication with the fluid supply arrangement.

7. Apparatus according to Claim 6, wherein said pressure chambers are elongate, with the direction of elongation in the substrate movement direction.

8. Apparatus according to Claim 6 or Claim 7, wherein said pressure chambers comprise at least one wall of piezoelectric material.

9. Apparatus according to Claim 8, wherein said wall comprises electrodes disposed so as to be able to apply a field to the piezoelectric material.

10. Apparatus according to Claim 9, said walls being polarised in a direction orthogonal to applied field.

11. Apparatus according to any on of Claims 7 to 10, wherein the pressure chambers corresponding with one row of nozzles are provided in a row of pressure chambers on a base, with the pressure chambers corresponding with each other row of nozzles being provided in a respective other row of pressure chambers on the same base.

12. Apparatus according to Claim 11, wherein there are provided on the base, divider means to define around each row of chambers a fluid manifold region for use in the supply of fluid to the chambers of that row, the respective manifold regions being separate from each other.

13. Apparatus according to Claim 12, wherein ports are defined in the base for communication with each fluid manifold region.

14. Apparatus according to Claim 13, wherein at least two ports communicate with each manifold region to provide a flow through each chamber.

15. Apparatus according to any of Claims 11 to 14, wherein the base is planar and the divider means comprises an apertured divider plate with said apertures defining the respective manifold regions

16. Apparatus according to any preceding claim, wherein the printhead comprises a plurality of like print head units spaced in the printhead direction.

17. Apparatus according to Claim 16, wherein each print head unit is substantially identical.

18. Apparatus according to Claim 16 or Claim 17, wherein said units are arranged such that the nozzle row on one unit combines with a nozzle row from a different unit to form an array wherein the nozzles within an array are supplied with the same ejection fluid.

19. Apparatus according to Claim 18, wherein said array is linear.

20. Apparatus according to Claim 18, wherein said arrays are disposed such that nozzle spacing along array is non-uniform.

21. Apparatus according to any one of Claims 18 to 20, wherein the gap spacing between the end nozzle of one row in an array and the neighbouring end nozzle of a different row in said array is greater than the inter-nozzle spacing within either of the rows.

22. Apparatus according to Claim 21, wherein said gap spacing equals the row length plus twice the inter-nozzle spacing.

23. Apparatus according to any preceding claim further comprising transport means for supplying a printable substrate to a print zone disposed to receive droplets ejected from said nozzles.

24. Apparatus according to Claim 23, wherein transport means supplies said printable substrate to said print zone in said substrate movement direction.

25. Apparatus according to Claim 23 or Claim 24, wherein said transport means comprises a paper handling drum.

26. Droplet deposition apparatus for depositing droplets on a substrate and comprising an elongate printhead, the substrate being movable relative to the printhead in a substrate movement direction and the length of the printhead extending in a printhead direction orthogonal to the substrate movement direction, wherein the printhead comprises at least one print head unit, the or each print head unit comprising a common base; at least two parallel rows of droplet liquid chambers provided on the base and extending in the printhead direction, each such chamber communicating with a droplet ejection nozzle so as to provide at least two parallel rows of nozzles extending in the printhead direction with the

rows being spaced apart in the substrate movement direction; actuation means for applying pressure to each selected chamber to effect the ejection of droplets from respective nozzles and a droplet fluid supply arrangement disposed to supply a different fluid to each row of chambers.

27. Apparatus according to Claim 26, wherein there are provided on the base, divider means to define around each row of chambers a fluid manifold region for use in the supply of fluid to the chambers of that row, the respective manifold regions being separate from each other.

28. Apparatus according to Claim 27, wherein ports are defined in the base for communication with each fluid manifold region.

29. Apparatus according to Claim 28, wherein at least two ports communicate with each manifold region to proved a flow through each chamber.

30. Apparatus according to any of Claims 26 to 29, wherein the base is planar and the divider means comprises an apertured divider plate with said apertures defining the respective manifold regions.

31. Apparatus according to any of Claims 26 to 30, wherein each printhead unit comprises at least three and preferably four rows of nozzles, with each row of chambers receiving from the supply arrangement a different colour of ink.

32. Apparatus according to any one of Claims 26 to 31, wherein said pressure chambers are elongate, with the direction of elongation in the substrate movement direction.

33. Apparatus according to any of Claims 26 to 32, wherein said chambers comprise at least one wall of piezoelectric material.

34. Apparatus according to Claim 33, wherein said wall comprises electrodes disposed so as to be able to apply a field to the piezoelectric material.

35. Apparatus according to Claim 34, said walls being polarised in a direction orthogonal to applied field.

36. Droplet deposition apparatus for depositing droplets on a substrate and comprising an elongate printhead, the substrate being movable relative to the printhead in a substrate movement direction and the length of the printhead extending in a printhead direction orthogonal to the substrate

movement direction, wherein the printhead comprises a plurality of like print head units spaced along the length of the printhead, each print head unit comprising at least two parallel rows of nozzles extending in the printhead direction with the rows being spaced apart in the substrate movement direction; actuation means for effecting the selective ejection of droplets from respective nozzles and a droplet fluid supply arrangement disposed such that a different fluid may be supplied to each row of nozzles.

37. Apparatus according to Claim 36, wherein the print head is movable relative to the substrate in the printhead direction to enable the nozzles of any row of nozzles to deposit droplets over a region of substrate broader than the length of the nozzle row.

38. Apparatus according to Claim 36 or Claim 37, wherein each printhead unit comprises at least three and preferably four rows of nozzles, with each row of nozzles receiving from the supply arrangement a different colour of ink.

39. Apparatus according to any one of Claims 36 to 38, wherein each row of nozzles has the same inter-nozzle spacing.

40. Apparatus according to any one of Claims 36 to 39, wherein the actuation means for effecting the selective ejection of droplets from

respective nozzles, comprises for each nozzle a pressure chamber in communication with the nozzle and in communication with the fluid supply arrangement.

41. Apparatus according to Claim 40, wherein said pressure chambers are elongate, with the direction of elongation in the substrate movement direction.

42. Apparatus according to Claim 40 or Claim 41, wherein said pressure chambers comprise at least one wall of piezoelectric material.

43. Apparatus according to Claim 41, wherein said wall comprises electrodes disposed so as to be able to apply a field to the piezoelectric material.

44. Apparatus according to Claim 43, said walls being polarised in a direction orthogonal to applied field.

45. Apparatus according to any one of Claims 36 to 44, wherein said units are arranged such that the nozzle row on one unit combines with a nozzle row from a different unit to form an array wherein the nozzles within an array are supplied with the same ejection fluid.

46. Apparatus according to Claim 45, wherein said array is linear.

47. Apparatus according to Claim 45, wherein said arrays are disposed such that nozzle spacing along array is non-uniform.

48. Apparatus according to any one of Claims 45 to 47, wherein the gap spacing between the end nozzle of one row in an array and the neighbouring end nozzle of a different row in said array is greater than the inter-nozzle spacing within either of the rows.

49. Apparatus according to Claim 48, wherein said inter-gap spacing equals the row length plus twice the inter-nozzle spacing.

50. Apparatus according to any one of Claims 36 to 49, wherein the droplet fluid supply arrangement for each printhead comprises for each row of nozzles at least one fluid manifold.

51. Apparatus according to Claim 50, wherein said ink manifold supplies ejection fluid to a pressure chamber associated with each nozzle.

52. Apparatus according to Claim 51, wherein ejection fluid is caused to flow through said pressure chamber to a further ink manifold associated with each row of nozzles.

53. Apparatus according to any one of Claims 50 to 52, wherein a port is provided that extends between an ink manifold and an ink supply chamber.

54. Apparatus according to Claim 53, wherein said ink supply chamber is located within an ink supply unit.

55. Apparatus according to any preceding claim, wherein said head unit or head units are mounted to an ink supply unit.

56. Apparatus according to Claim 55, wherein said ink supply unit is of equal or greater length than the sum of the lengths of said print head units.

57. Apparatus according to any one of Claims 54 to 56, wherein said ink supply unit comprises a plurality of ink supply cavities at least one ink supply cavity communicating with a respective row of nozzles.

58. Apparatus according to Claim 57, wherein a supply cavity is provided for each type of ejection fluid.

59. Apparatus according to Claim 58, wherein said supply cavity is divided into an inlet supply cavity and an outlet supply cavity.

60. Apparatus according to Claim 18 or Claim 45, wherein said head unit or head units are mounted to an ink supply unit and said ink supply unit comprises a plurality of supply cavities each communicating with a respective array.

61. A method of supplying ink to a print head unit comprising the steps: providing a print head unit comprising at least two rows of nozzles extending along a print head substrate the length of each row lying in a print head direction direction, said rows lying parallel with the other rows in a direction orthogonal to said row length and wherein each row comprises an associated row of pressure chambers, providing an ink supply unit comprising supply manifolds and removal manifolds, disposing said ink supply unit and said print head unit in such a relation that each of said rows of pressure chambers communicates with a supply manifold and a removal manifold, said supply manifold and said removal manifold being adjacent, causing ejection fluid to flow from a supply manifold to a removal manifold through a pressure chamber in a flow direction; and wherein said flow direction for adjacent rows of pressure chambers are opposite.

62. A method according to Claim 61, wherein said print head unit comprises at least three rows of nozzles.

63. A method of printing a multicolour image comprising the steps: providing a printing apparatus according to any one of Claims 1 to 60, supplying different colour ink to said rows of pressure chambers, ejecting a multi-colour swath from said print head unit, indexing said print head unit in said print head direction direction, and ejecting a further multi-colour swath from said print head unit.

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